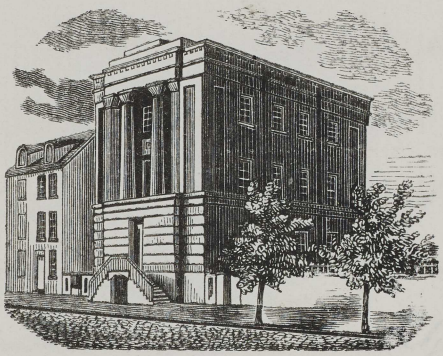
AN ESSAY ON

Scientific Lecturing.

RESPECTFULLY SUBMITTED TO THE FACULTY OF THE



HOMŒOPATHIC MEDICAL COLLEGE

OF PENNSYLVANIA,

On the 21st day of January, Eighteen Hundred and Fifty-six.

By Harrison O. Apthorp.

Of Massachusetts.

So considerable a part of Education is acquired in these days through the medium of the lecture-room, that it seems proper to inves-tigate the claims, and to weigh the value of this mode of imparting knowledge.
An extended essay on this subject would treat of the evils and abuses to which it is liable, and point out the means of correcting them; would consider the question of its utility or value in comparison with other modes of instruction; would designate the subjects, or branches of study best suited to the lecture-room; would discriminate nicely as to how far the hearing of lectures should be relied upon, and to what extent the student ought to avail himself of collateral reading and study; with various other particulars of great value, in relation to the very prevalent mode of educating which forms the subject of this treatise.
But as I have no liberty to extend the limits

of a College thesis, it will be necessary to assume that the many branches of medical science are to be taught as they are now taught; viz. by the oral instructions of practical men, who themselves have learned science by the same method, and have added more or less to the knowledge thus gained, by their own practice and experience. And having assumed this, I shall proceed to point out what are the requisite qualifications to prepare the man of science most ably and effectively to discharge the duties of a lecturer. The teacher will of course be required and supposed, to be sufficiently well versed in the science which he is to lecture upon, to give to his pupils clear and correct views of the leading principles of it. But however clear the subject may be to himself, it should be borne in mind by him, that it is more or less involved in obscurity, to his pupils. It therefore becomes a primary object, and a duty, with the teacher, to study perspicuity; and to seek

out the most simple, natural, and intelligible mode of presenting his science to their minds. It was said of a man who was justly esteemed most sound, and often spoken of as being at the head of science in this country, and of very high standing abroad, that he was "too profound" for a certain place he was nominated to fill viz. that of Professor of Chymistry in a University. That what was to him, as simple as the alphabet, the students would not be able to understand. Now I do not apprehend that we have much to fear from the profundity, or too thorough scholarship of our Professors. but it is not difficult to understand what was meant in the case of that learned chymist. It is a fault in teachers to forget that the numerous minds intent upon their demonstrations and speculations, cannot all be reasonably supposed to seize upon their idea at once. The subject is less familiar, in short, to the pupils than it is to the teacher, and it should be his care to present

it in the clearest light to their minds. With a view to this, he is to make such a division or arrangement, such a method or plan, in his lectures, as will be most likely not only to be free from all obscurity in itself, but to make such an impression on the pupils' minds as to be permanent and salutary; to favor the taking of notes by the latter, and to facilitate the transcribing of them, so as to present a methodical and well-arranged view of the subject.

Thus much at the very least, it is necessary to say in relation to the plan, form, and method of composition, in a lecture or series of lectures. For it is indeed true that while one writer will produce a very learned composition, replete with sound doctrine and important facts, which may yet fail to make a clear and definite impression upon the mind of a hearer; another writer perhaps less learned than the first, whose thoughts shall be well-arranged & methodically classed shall not only produce an

orderly system of facts and principles, but the im-
-pression of such a lecture will fix itself indelibly
in the memory of an attentive hearer.
But the composition and arrangement of a course
of lectures are not the most important items in
the accomplishment of one who is to dispense
such a system of instruction. The utterance of
such lectures is the next to be taken up; and
we are now to consider at length the structure
and function of the voice; the action and exertion
of this wonderful organ; its training and care;
its culture and use; its powers and capacities;
and to learn from a careful investigation of its
nature, how the lecturer may best avail himself
of its agency in dispensing the knowledge which
it is his province to impart.
The organ principally concerned in the production
of voice is called the Larynx; an examination
of this organ shows it to be a cartilaginous box,
located at the upper part of the trachea. It forms

the projection in the front of the neck called the pomum Adami. It is composed of four principal cartilages; the lowest of these is the cricoid, which forms the inferior part of the Larynx. The thyroid cartilage is situated above the cricoid, and is articulated with it by a movable joint at the inferior cornua. This large cartilage constitutes the anterior, prominent, and lateral part of the Larynx. Two, much smaller cartilages, are also articulated with the posterior part of the cricoid, forming also a movable joint. Around this articulation is a sinovial capsule; before it, the thyro-arytenoid ligament; and behind it the crico-arytenoid. Three fibro-cartilages also form part of the constituents of the Larynx. These are the epiglottis, and two small cartilages, called from their position, the supra-arytenoid cartilages, or capitula Santorini.

On examining the interior of the Larynx, we perceive two clefts one above the other, the uppermost being usually oblong shaped. It is bounded laterally by

two folds of the mucous-membrane; anteriorly by the thyroid cartilage and the epiglottis; and posteriorly by the arytenoid cartilages. The two folds of the mucous membrane which bound it laterally, pass from the epiglottis to each arytenoid cartilage, and are called the Superior vocal cords. Just below this is a second cleft, also oblong and of triangular shape; the base being behind; it is bounded anteriorly by the thyroid cartilage, posteriorly by the arytenoid muscle, & laterally by two folds of the thyro-arytenoid ligament, passing from the anterior part of the arytenoid cartilage to the posterior part of the thyroid. These folds are called the inferior vocal cords. The term glottis is applied to that part of the Larynx engaged in the production of voice; or usually considered to be so engaged. viz the part between the inferior cords, with the cords themselves.

The Larynx is susceptible of motion as a whole, as well as in its constituent cartilages. It may be raised, depressed, carried forwards or backwards. The movements however most concerned in the production

of voice are those which are effected by the action of the intrinsic muscles; these are the muscles passing among the cartilages from the margin of one to the sides, base, &c of another, connecting them together & moving them in various directions.

The production of voice requires that air be sent from the lungs, which in passing through the glottis may throw the muscles into vibrations, and afterwards make its exit through the vocal tube, that is by the mouth & nasal fossae. Simple expiration does not however produce it, otherwise we should have the vocal sound accompanying each contraction of the chest. Volition is necessary to excite the requisite action of the Larynx by means of its muscles, and by it the tones and intensity of the voice are variously modified. The vocal cords are by their structure cal-culated to vibrate like tense membranes as they contain elastic tissue and are so attached to the cartilages of the Larynx as to be susceptible of tension either by the elevation of the cricoid-cartilage towards the thyroid or by the retraction of the arytenoid-cartilages. By the approximation of the arytenoid-cartilages the aperture of the glottis is narro

and it is dilated by the action of the lateral crico-arytenoid muscles which draw the arytenoid cartilages asunder. In the ordinary position of the glottis during respiration without vocalization, the vocal cords have their inner edges inclined from each other; but in order to produce sound they must be made parallel. To place them in this position is the office of the thyro-arytenoid muscle. In vocalizing the ligaments vibrate to their entire breadth, and with them the thyro-arytenoid muscle, & to a certain extent the adjacent elastic tissues of the Larynx; & also the air in & beyond the respiratory passages.

For the deepest notes the vocal cords are much relaxed by the approximation of the thyroid towards the arytenoid cartilages. The cords are void of tension & even wrinkled; but they become stretched by the current of air & thus acquire the degree of tension necessary to vibrate. The medium state in which the cords are neither relaxed nor stretched, is the condition for the middle notes of the voice & those most easily produced in singing. The higher notes of the natural voice are produced by the lateral compression of the vocal cords & the narrowing

of the space between them, by means of the thyro-arytenoid muscle, & further by increasing the force of the current of air. During inspiration the glottis is slightly dilated & in expiration it is contracted. In the quiescent state the aperture of the glottis is widely open & at the moment of the emission of sound it is more narrowed, the margin of the arytenoid cartilages being brought into contact, & the edges of the vocal cords being approximated & made parellel.

This is perhaps as brief a description as can give any adequate idea of the curious & complicated machine of which we are speaking; but it is sufficient to satisfy the most superficial observer that no such mechanism can be properly worked, or used to the greatest advantage without the observance of certain rules; that its greatest capacity cannot be ascertained without regard to nicely ordered experiments, that its rigorous condition cannot be maintained without a knowledge of the laws of respi-ration, & an intelligent acquaintance with all the physio-logical relations of this most important vital function.

It is true that nature alone will usually be a sufficient guide

to the use of the voice, when it is merely required to make known our wants. But the experience of the professional world has clearly shown, that in the correct and effective use of this wonderful organ, few have ever become adepts without devoting time and labor to the study of its laws, & the training of its powers. This experience has also shown that in a frightful majority of cases the voice has been "run out" & "used up" before its uses have been learned, or its best powers developed.

The teacher then, who is to instruct pupils in the lecture-room, will find it for his interest to look well to the training of his voice. He is to ascertain as early as may be upon what pitch he can speak loudly with greatest ease to himself*. This will be found to be a medium pitch with regard to the compass of his own voice, however

* Care is to be taken to avoid the confounding of pitch with inflection. The for has reference only to the prevailing sound, or note of speech; its elevation as me by the musical scale; while the latter applies to the course or direction, upward or downward, which the voice takes in uttering a syllable.

high or low it may be when referred to the musical scale. Upon this pitch he should exercise his voice fully and frequently in loud reading, or by the loud utterance or explosion of the elementary sounds of language. For which exercise I shall proceed to give directions, premising that during its performance, care should be directed to the character of sound emitted; each syllable should be uttered with clearness and force, free from all admixture of nasal or other bad sounds; the voice is to proceed from the lower part of the organ, and to come out free & unobstructed through the mouth. It is proper here to explain the process of exploding as some authors have written with obscurity upon the subject. For instance it has been spoken of as "coughing out" the sounds; and I have been informed by a practical Elocutionist that a lady pupil of his, had endeavored to avail herself of these directions and had so much injured her lungs, in vain attempts to "cough out" the elements of speech, that she went into a decline shortly after, having actually coughed herself into pulmonary consumption. To explode is not at all like coughing; nor can it be said to resemble it

in any other respect than in the suddenness of the effort required by some beginners in exploding. There is a certain conformation of the vocal organ by which the short vowels (to give a simple instance) in syllables like bat, bet, bit, bot, but may be uttered short and resounding like the crack of a whip, or the explosion of a torpedo. and this effect is produced not by vociferating with great effort; but by virtue of other conditions; viz. the abruptness of the utterance, the shape of the cavity of the mouth, larynx &c which are ordered with reference to intensity rather than loudness of voice. The skill requisite for changing the shape of the cavity, in order to utter with sufficient rapidity, the different vowel-sounds is the result of practice; and can easily be acquired by any person who has no positive weakness, or morbid condition of the lungs, and no unnatural rigidity of the fauces.*

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* In one instance I had, among thirty-six pupils, but a single one who could not learn to explode; in another, there were but three in about fifty-eight who found any difficulty. And of these three, two made more improvement in the use of the voice, than pupils who have no impediment whatever, commonly do make.

This practice of exploding should be persevered in, until all the different elementary sounds* which enter into the construction of language can be produced with ease and clearness; the ear will thus be trained to a nice discrimination of all the vowel sounds not less than 16 (including the diphthongs) in number; all perfectly distinguishable by the common ear, though often confounded for want of care. Great stress is to be applied also to the enunciation of the consonant-sounds, almost amounting to caricature. These are then to be uttered in successive combinations of vowel & consonant sounds, forming the various syllables of language. No one who shall continue in this practice for a short time can fail to recognize in it, a most useful & salutary exercise, both as to its practical effect upon the ease & force of his physical utterance, and as it shall reveal to him the incorrectness & deformity of common speech. When the pupil shall have habituated himself by such exercises as these, to the correct use of his voice, when it comes out full, loud, and clear, free from every

*These are not less than 38 in number. Latham and some other philologists make 40.

degree of nasality, he is to elevate the pitch of his voice that is, take a higher musical note as his guide, & repeat the same exercises on this new pitch; in this way he will greatly extend the compass of his voice; which may be as deficient in the lower tones, or more so, than in the higher ones; if this be so, his practice should be chiefly directed to exercises on a lower pitch; that the lower notes of his voice may thus be strengthened. The vocal exercises which have been recommended, are to take the place of what was called among the ancient Romans, Anaphonesis. If any one should prefer to follow the precise plan in use among them, I have no doubt it would be equally productive of good results. Their rule was, after proper bodily exercise, to begin at the lowest tones of the voice & to ascend gradually to the highest; & thence again to descend gradually to the lowest. It is said that they would pronounce five hundred lines in this manner & that these were committed to memory, in order that the execution of the voice might be less embarrassed. In proof of the wonderful capacities & powers of the voice it would be easy to refer to experiments

recorded, of very long continuance in loud speech without appreciable injury to health; & to conversations conducted across a wide river by persons whose voices have become sonorous by much use. But as such anecdotes only prove that the voice gains strength or loudness by use, it will more effectually advance the object of this essay, to speak of that which comes within the range of my own experience, & is confirmed by daily observation in my own practice.* The object with him who understands the legitimate and proper use of the voice, and who would avail himself of its resources, should be to so train the voice that it may be able to deliver language with reference to the economy of sound, and at the same time be distinctly

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During a considerable part of the winter of '51-52 a Professor of sci who read but 4 lectures a week, but misused his voice, was contin complaining of hoarseness & fatigue in his throat; while at the same time I found no difficulty from physical efforts of voice in lecturing 5 hours daily. I felt no other fatigue than that arising from the intellectual labor of teaching.

audible at a considerable distance from the Speaker. And it is with a view especially to this, that the attention of the pupil has been called to the peculiar explosiveness of the vowel sounds, that is, the power by which they are rendered audible.

Now, in the exercise of this exploding power, if due regard be paid to the respiratory function, & the practice be so conducted as not to interfere with this, there is scarcely a limit to the power of audibility which may be acquired without recourse to vociferation, by having regard to intensity in the character of the sounds produced. It may be well to remark here, that this explosiveness or intensity of sound, is not at all adapted to a large room, with a small audience; or to any circumstances where an echo exists, to the annoyance of the speaker or hearer. Under such circumstances, an opposite kind of speech more approaching to aspirated or whispered sounds, will be much better; for sounds of the latter kind will reach the ears of an auditor unaccompanied by reverberation; which in case of explosive sounds will render language quite unintelligible.

We have said little more, hitherto, than what relates to the physical training of the voice. It is obvious that in a finished speaker or accomplished lecturer much more is to be looked for, than the power of making himself heard; of continuing long in speech without detriment to health, and of the easy utterance of language.

It is also necessary that his intonation should be agreable, his transitions natural & easy; his pauses judicious, his pronunciation good, or at least free from vulgarity; his emphasis well-placed; and as above stated, that the composition & arrangement of his lectures should be ordered with such a regard to symmetry, fitness, and perspicuity, as to make a correct and lasting impression upon the mind.

Well aware of the general distaste in the scientific world to all that is ornamental in style, or figurative in diction; & honoring as I do that manly adherence to plain facts & the naked statement of principles, I yet deplore that disregard to literary culture & even to correctness of style, which savours so strongly of superficial learning, and seems to me to threaten the permanency of that high position which should be assumed by all scientific institutions.

Is it, then, requiring too much of Professors & Lecturers in Colleges, to insist that they should have especial care to perfect correctness in the use of the mother tongue? and that in regard to the vocabulary of science, and the technical terms so constantly & necessarily employed in connection with the English, they should be careful to have regard to the grammatical use of such terms, & in no case to couple the singular & plural of different languages. May we not go a little further than this without fear of incurring censure as a literary-pedant, and assert that a well-written lecture & delivered in a style somewhat elegant, other things being equal will stand a chance of being more attentively listened to by the majority of hearers, & may even make a more enduring impression upon the memo Whether this be the case or not, the lecturer may be assured that he himself will find a pleasure, & feel a laudable pride, in thus adding a grace to knowledge, & investing the treasures of science in the garb of refinement & taste.

Often have we heard it from the lips of the sagacious & practical man, be he the dispenser of law, physic, or of scientific truth

that the dandyism of letters is to be set aside. He bids his pupils beware of Rhetoric, despise the polish of diction, & confine themselves to fact. This might be very good advice in a certain state of society, & under certain imaginable conditions in the progress of ethics; but we have greatly misjudged the causes of success & professional distinction, if the subtlety of terse logic & sound argument have been able to dispense with elegance of style, finish of diction, or even with the ornaments of rhetorical & eloquent speech.

It has been said that no good lawyer was ever a tolerable poet. We have no quarrel with this remark, any further than to say that some of the most successful pleading we have ever heard, savoured more of poetry than of fact. And as for rhetorical flourish, the most distinguished lawyer, perhaps, in all the New-England states, is certainly the most ornamental & flowery writer, & at the same time the most persuasive speaker of all the lawyers I have yet heard.

Persons of taste expect to be pleased as well as instructed; & gracefulness of expression is never thrown away when

applied to the adornment of scientific truth.

It must here be admitted that in lecturing upon matters of science, a great many, & even a very considerable proportion, of the lectures in a course, must be filled up with a variety of detail, which leaves no room for ornament, which indeed is ill-suited to the formality of a rhetorical composition, & cannot even be uttered in well-rounded periods. All this is readily granted; & we acknowledge also that it would militate against the best interests of science, to aim at a scholastic style in explaining minutiæ, in nice demonstration, & in describing organs & functions. Inasmuch as demonstration & definition, most imperatively call for conciseness of language & simplicity of style.

But, for this very reason viz, that so large a portion of a scientific course must from necessity be wholly devoid of ornament, that we argue the need of a clear, unhesitating delivery, & of such vocal training and acquired skill in the use of the voice, as to render that, not only tolerable but acceptable to the ear, which must

otherwise from its intrinsic dryness be at best listened to with effort. Again, Is it not a relief to the ear already fatigued with the tedium of protracted detail, to listen to the well expressed reflexions or inferences of a judicious & thoughtful lecturer? one who perhaps breaks out in ad-miration of the great & high purposes for which the objects he describes are created! Would it seem to detract at all from the utility & practical value of lectures like those of a certain distinguished Physiologist of Europe, that in showing to his pupils how fearfully & wonderfully we are made, is sometimes led into short digressions, or induced to break out in admiration of Nature's miracles, or the inscrutable ways of Providence? Was it ill-timed, or in bad taste for him, after his minute description of the organ of hearing, & his lucid exposition of those wonderful lenses of vision, to exclaim. "Surely he who made the ear, shall ~~He~~ not hear? and he who formed the eye, shall He not see?"

It seems to me that Science will lose but little, at the hands of such men! at all events, I would venture

to hazard the reputation of scientific soundness, by indulging occasionally in such digressions.

These matters must however be left to the discretion, taste or the temperament of the lecturer; and I have no doubt that some of the most scientific men & perhaps best lecturers in the world, make an invariable rule, never to introduce matter which is not essentially involved in scientific demonstration.

With regard to those lectures or portions of lectures, which, from the nature of their subject matter, do not admit of any embellishment, (and it is granted that such matter is abundant) they should be uttered with distinctness & force; and on a pitch of voice sufficiently elevated to enable the most remote listener to hear without effort.

I mention this, and some other points which appear self-evident, for the reason that instructions require to be repeated often, when they are very often wholly neglected & lost sight of.

It is perhaps quite natural to let the voice fall in pitch, and diminish in intensity, as we utter portions of sentences

which seem less important than matter which goes before. But it should be borne in mind by the lecturer, that even when speaking of that which is comparatively unimportant, or when making some trifling exceptions to cardinal rules laid down, or in adding suggestions to go for what they are worth, he is to make himself audible; and should by no means suffer himself to fall into a low, muttering indistinctness, by which a portion of his audience must inevitably lose matter, which if it be worth writing or speaking, ought to be presumed to be worth the hearing also.

With regard to the care & preservation of the voice, I believe but little can be said now in addition to the excellent rules laid down by ancient writers; one of whom has declared that "He who would strive for the mastery, must be habitually temperate in all things". "Moderate in the use of wine, and in the indulgence of the table; and not given to any personal excess".

The voice should not be urged beyond its strength, or strained to its utmost limit. or continue long on a

high pitch without intermission. Certain things are found to be injurious to the voice and are therefore to be avoided. Nuts, dried fruits and cold drinks are of this nature. Suetonius says of Nero. "Abstinere pomis cibisque (voci) officientibus solebat."

Some things are found to be serviceable to the voice, and are used by singers; warm mucilaginous drinks in case of dryness of the fauces; barly water, and saccharine preparations. But I should have more reliance in abstaining from things which are injurious, than in having recourse to any artificial preparations. One who would follow lecturing habitually as a profession, or who would impart impart instruction to classes daily, without paying attention to rules of practice, or to directions similar to those given in this essay, must do it at best, under great disadvantages. But while this assertion is confidently made, it is not forgotten that there are those who need training much less than others do. It is not, indeed intended to teach those who are already adepts. We may perhaps safely

go a little further than this, and admit that many persons are naturally, as it were, or by the common chances of education, easily become, enabled without special care or training, to use the voice with so much effect, and to articulate with such distinctness, as to deserve immunity from the reproach which so generally & so justly attaches to American speakers.

I have listened with more satisfaction to certain lecturers who had not enjoyed the advantage of good vocal training, than to some others whose pretensions to artistic elocution were very high, but who had not learned the "Ars celare artem", who had devoted both time and labor to the attainment of eloquence; but in their zeal for excellence had forgotten to hide the intermediate steps by which they had reached their present elevation. Even art may show, a blemish, when unsupported by natural ease of manner and general good sense.

It is not the object of such an essay as this, to go into a description of all the resources made use of,

in teaching the art of reading or lecturing. Had such a course been contemplated, the writer would have entered into an account of the different kinds and characters of voice, both natural and artificial; an extended chapter on inflections would be necessary; an interesting exposé of the subject of measure would have been made, in order to show how it affects delivery as well as composition; what are the requirements of the physical well-being as to the management of the breath; how the normal and healthy play of the respiratory function, is perfectly compatible with long continuance in speech; how speakers abuse and injure both voice & health from an ignorance or disregard of its laws; with many other matters of interest in this connection.

Peradventure the brief directions above given for the exercise of the voice, the rules for exploding the elements and syllables; the distinction between intensity and vociferation; between pitch & inflection, as we have not given anything like an adequate idea of an elocutionary

course, may be deemed in some measure gratuitous here. But as it seemed necessary to introduce a Physiological view of the vocal Structure and Function, these explanations appeared to the writer to have an intimate & necessary connection with this view; and indeed to be required, to enable the scientific student to conduct such exercises himself, as well as to comprehend why & how they are necessary.

In conclusion, it is only necessary to add, that the difficulty of treating this subject in such a manner as to constitute a succinct essay, either on the simple training of the vocal powers; or on the full and perfect accomplishment of the scientific lecturer, has been greater than was originally anticipated, both on account of many important illustrations not susceptible of being made on the written page, and also from the inherent nature of the subject, which more emphatically than most others, required the "viva voce" explanations of the lecture-room.

But if the subject has been presented in such a manner as to render apparent, the imperative need of practical training for the voice, methodical arrangement for scientific instructions, graceful delivery and forcible utterance in imparting knowledge, then may the objects of this essay be considered as accomplished —

AN ESSAY ON

Curative agents & their action.

RESPECTFULLY SUBMITTED TO THE FACULTY OF THE

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OF PENNSYLVANIA.

On the [illegible] day of January, Eighteen Hundred and Fifty-one

By Theodore C. Bacon, [illegible]

of [illegible]